

CONCLUSION


Applicants submit that the application is in condition for allowance and respectfully request the Examiner to facilitate the application proceeding to issuance. Should the Examiner have any questions, the Examiner is respectfully requested to contact the undersigned attorney.

The Commissioner is authorized to charge any additional fees which may be required, including petition fees and extension of time fees, to Deposit Account No. 23-2415 (Docket No. 8003-370).

Respectfully submitted,

WILSON SONSINI GOODRICH & ROSATI

Dated: 11/12/02

By: 
U.P. Peter Eng, Reg. No. 39,666

650 Page Mill Road
Palo Alto, CA 94304-1050
(650) 493-9300
Customer No. 021971

U.S. Serial No. 09/624,712 (Park et al.)

MARKED VERSION TO SHOW CHANGES MADE TO CLAIMS**In the Claims:**

Claims 1 and 4 are amended as follows, and claims 2-3 are canceled. Claims 5-10 are also added herein.

- 1 1. A method for sequencing a developer process to reduce wafer pattern defects,
2 comprising:
3 dispensing a substantially inert material onto a wafer surface to form a
4 layer of substantially inert material prior to dispensing a developer fluid, wherein the
5 substantially inert material is dispensed through a selected multi-dispense nozzle;
6 dispensing the developer fluid through the same multi-dispense nozzle
7 onto the layer of inert material while spinning the wafer surface substantially
8 simultaneously to induce a flow of the developer fluid across a portion of the wafer
9 surface toward the outer edge of the wafer surface;
10 allowing the developer fluid to puddle on the wafer surface for a
11 predetermined dwell time to permit substantial completion of a developing chemical
12 reaction to occur;
13 dispensing a fresh charge of the developer fluid in addition to the
14 previously dispensed developer fluid through the same multi-dispense nozzle; and
15 dispensing another quantity of substantially inert material through the
16 same multi-dispense nozzle to rinse the wafer surface.

- 1 ~~2. A method for sequencing a developer process to reduce wafer pattern defects,~~
2 ~~comprising:~~
3 ~~inducing a flow of developer fluid across a portion of a wafer surface~~
4 ~~for a time interval greater than a transit time for a fluid element to reach an outer~~
5 ~~wafer edge, the time interval prior to the substantial completion of the developing~~
6 ~~chemical reaction.~~

- 1 ~~3. A method for sequencing a developer process to reduce wafer pattern defects,~~
2 ~~comprising:~~
3 ~~dispensing a fresh charge of developer fluid over the wafer after a~~
~~predetermined dwell time to permit substantial completion of a developing chemical reaction.~~

- 1 4. The method of claim 13 further comprising the step of:
2 dispensing another quantity of a substantially inert material over a
3 wafer surface subsequent to dispensing the fresh charge of developer fluid while
4 rotating the wafer surface at relatively high speed.

5. The method as recited in claim 4 further comprising the step of:
spinning the wafer surface at relatively high speed to achieve a
selected level of dryness.

6. The method as recited in claim 1, wherein the substantially inert material and
the developer fluid are dispensed through the same multi-dispense nozzle while
positioned within a single common predefined region above the wafer surface.

7. A method for dispensing developer solution and deionized water to form
patterned images onto a semiconductor wafer comprising the following steps of:
selecting a multi-port nozzle for dispensing at least one developer and
deionized water;

dispensing an initial amount of deionized water onto a resist-coated
substrate wafer through a first selected outlet formed in the multi-port nozzle to
provide a layer of deionized water on the wafer prior to dispensing a developer fluid;

dispensing an initial charge of developer fluid onto the layer of
deionized water through a second selected outlet formed in the multi-port nozzle
while substantially simultaneously spinning the wafer to induce a flow of the
developer fluid towards an outer edge of the wafer;

puddling the developer fluid on the wafer for a predetermined dwell
time to permit substantial completion of the developing chemical reaction to occur;

dispensing a fresh charge of developer fluid from the multi-port nozzle
in addition to the initial charge of developer fluid previously dispensed; and

dispensing another selected amount of deionized water through the
first selected outlet formed in the multi-port nozzle in order to rinse the wafer.

8. The method as recited in claim 7, wherein the multi-port nozzle both dispenses the deionized water and the developer fluid from substantially the same position relative to the wafer.

9. The method as recited in claim 7, wherein the initial charge of developer fluid and the fresh charge of developer fluid consists of two different types of developer solutions.

10. The method as recited in claim 9, wherein the fresh charge of developer fluid is dispensed through a third selected outlet formed in the multi-port nozzle.

11. A method for reducing precipitation of a developer reactant on a photoresist-coated wafer by lowering a sudden change in pH comprising the following steps of:
selecting only a single multi-port nozzle for dispensing at least one developer and deionized water;

dispensing an initial amount of deionized water onto a photoresist-coated substrate wafer through a first selected outlet formed in the multi-port nozzle to provide a layer of deionized water on the wafer prior to dispensing a developer fluid;

dispensing an initial charge of the developer fluid through a selected second outlet formed in the same multi-port nozzle while spinning the wafer to induce a flow of the developer fluid towards an outer edge of the wafer;

puddling the developer fluid on the wafer for a predetermined dwell time to permit substantial completion of the developing chemical reaction to occur;

dispensing a fresh charge of the developer fluid from the same multi-port nozzle in addition to the initial charge of the developer fluid previously dispensed; and

dispensing another selected amount of deionized water through the first selected outlet formed in the multi-port nozzle to rinse the wafer surface while spinning the wafer.